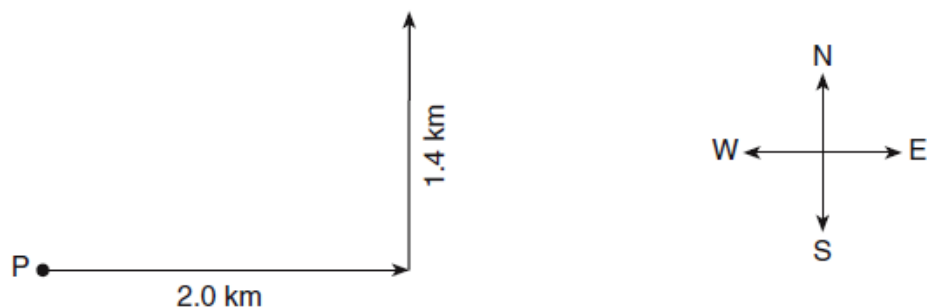


## Displacement Vectors

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1. Base your answer to the following question on the information and vector diagram below and on your knowledge of physics.

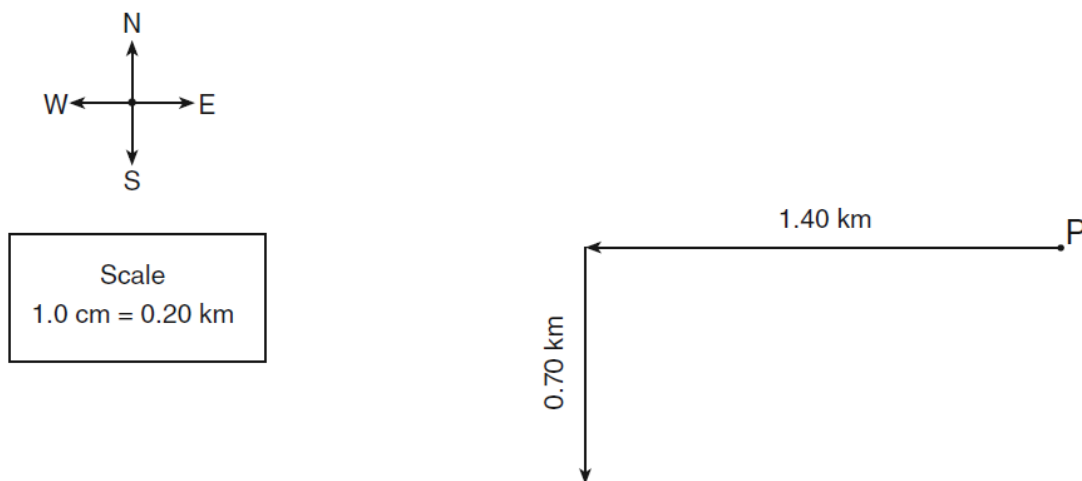
A hiker starts at point  $P$  and walks 2.0 kilometers due east and then 1.4 kilometers due north. The vectors in the diagram below represent these two displacements.



Using a protractor, determine the angle between east and the hiker's resultant displacement.

Base your answers to questions 2 through 4 on the information below.

A girl rides her bicycle 1.40 kilometers west, 0.70 kilometer south, and 0.30 kilometer east in 12 minutes. The vector diagram below represents the girl's first two displacements in sequence from point  $P$ . The scale used in the diagram is 1.0 centimeter = 0.20 kilometer.



- Determine the measure of the angle, in degrees, between the resultant and the 1.40-kilometer displacement vector.
  - Determine the magnitude of the girl's resultant displacement for the entire bicycle trip, in kilometers.
  - Calculate the girl's average speed for the entire bicycle trip. [Show all work, including the equation and substitution with units.]
-

## Displacement

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5. Which term represents a scalar quantity?

- A) **distance**                      B) displacement  
C) force                          D) weight

6. Which is a vector quantity?

- A) distance                      B) speed  
C) **displacement**              D) time

7. An object is displaced 12 meters to the right and then 16 meters upward. The magnitude of the resultant displacement is

- A) 1.3 meters                  B) **20 meters**  
C) 28 meters                  D) 4.0 meters

8. If a man walks 17 meters east then 17 meters south, the magnitude of the man's displacement is

- A) 17 m    B) **24 m**    C) 30. m    D) 34 m

9. Which is constant for a freely falling object?

- A) displacement              B) speed  
C) velocity                      D) **acceleration**

10. If a woman runs 100 meters north and then 70 meters south, her total displacement will be

- A) **30 m north**                  B) 30 m south  
C) 170 m north                D) 170 m south

11. Distance is to displacement as

- A) force is to weight  
B) **speed is to velocity**  
C) velocity is to acceleration  
D) impulse is to momentum
-

**Answer Key**  
**vector displacement**

1.  $35^\circ \pm 2^\circ$  *or* for an answer that is the angle between the 2.0-km vector and the student's response to question 67.
  2.  $32^\circ \pm 2^\circ$
  3.  $1.3 \text{ km} \pm 0.2 \text{ km}$
  4.  $v = 0.20 \text{ km/min}$  *or*  $v = 3.3 \text{ m/s}$
  5. **A**
  6. **C**
  7. **B**
  8. **B**
  9. **D**
  10. **A**
  11. **B**
-

**Question ID's in  
Numerical Order**

5. 4245
  6. 160
  7. 553
  8. 852
  9. 1068
  10. 1289
  11. 1517
  4. 5637
  3. 5638
  2. 5639
  1. 7337
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